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BARRHILL CHERTSEY IRRIGATION LIMITED – ANNUAL REPORT

CRC162882 ANNUAL REPORT NOVEMBER 2016

CONTENTS

1. Introduction 2

2. Conditions Summary 2

 Condition 1 2

 Condition 2 2

 Condition 3 4

 Condition 4 5

 Condition 5 12

 Condition 6 16

 Condition 7 16

Appendix 1: BCI IRRIGATION SCHEME EMS REVIEW 2016..... 17

Appendix 2: Updated Scheme Management Plan 18

Appendix 3: Revised N Load Calculation – v6.2.2 OVERSEER..... 19

1. INTRODUCTION

Barrhill Chertsey Irrigation Limited (BCI) hold resource consent CRC162882 to permit shareholders from BCI and Acton Farmers Irrigation Co-Operative (AFIC) to collectively discharge up to 2,981 tonnes N/year to groundwater from 40,000 ha of farming activities within the Ashburton District.

Currently BCI is consented to take up to 17 m³/s of water from the Rakaia River, of which up to 3 m³/s is provided to AFIC, east of Rakaia. Only 8.5 m³/s of water is allocated to BCI shareholders, with further development of the scheme planned in the future.

All existing shareholders from both schemes were required to complete individual Farm Environment Plans (FEP) by 10 September 2015 and be audited within 24 months. New shareholders need to complete an FEP prior to using water and are audited within 12 months of using water.

An annual report is due 30 November each year to provide a summary of the ASM programme.

The following is a summary of compliance of consent conditions for shareholders from both BCI and AFIC irrigating in the 2015-16 season and includes:

- V6.2.2 OVERSEER updated Nitrogen Discharge Allowance
- 2016 Scheme Management Plan Review Report
- Updated Scheme Management Plan for Approval

2. CONDITIONS SUMMARY

CONDITION 1

This consent authorises:

- a. the use of land for farming; and*
- b. the discharge of nutrients to water arising from the use of farming authorised in clause a.*

No comment required.

CONDITION 2

The use of land and discharge specified in condition 1. shall only occur within a maximum of 40,000 hectares on:

- a. the areas marked as Areas 1-8 on attached plan CRC141388, which forms part of this consent; and*
- b. any land located between the Rakaia and Rangitata Rivers covered by a separate consent to use water that has been taken under CRC132861 or any subsequent variation thereof.*

BCI water is irrigated onto 201 properties through BCI and AFIC irrigation schemes between the Rakaia and Rangitata Rivers (blue properties seen in Figure 1). Approximately 53% of properties irrigated with BCI water also received water from another source. The "Primary Water Sources" map (Figure 2) shows the main water source for BCI and AFIC shareholders. In many cases, BCI and AFIC water is used to support groundwater takes, which are the primary source of water on the property.

The "BCI Irrigated Area" was calculated using two methods:

1. Where BCI water was used to irrigate a particular area; the actual area irrigated by BCI was used.
2. Where BCI water was mixed with other sources of water; the BCI irrigated area was calculated using the relative proportion of water by flow rate. E.g. if 50 l/s comes from BCI and 25 l/s from groundwater, then 2/3rd of the total irrigated area is attributed to BCI.

The total estimated area irrigated using BCI water during the 2015-16 irrigation season was 25,406 ha.

It is anticipated a further 830 ha will start to be irrigated by BCI in the 2016-17 season, bringing the total estimated area of the scheme to 26,200 ha in the coming season.

TABLE 1: SUMMARY OF AREAS MANAGED UNDER CONSENT

	2014-2015 Measured Area	2015-2016 Measured Area	Estimated Area*
Total FEP Managed Area (ha)	40,173	53,699	25,406
Total Irrigated Area (ha)	29,238	44,655	25,370
Total Effective Dryland (ha)		7,107	3,302
BCI Scheme Irrigated Area (ha)	12,704	18,586	19,224
AFIC Scheme Irrigated Area (ha)	5,274	4,820	6,182
Total BCI Irrigated Area (ha)	17,978	23,406	25,406

*From consent application

The significant increase in the irrigated area during the 2015-16 season was due to the commissioning of the Stage 2 Barrhill-Chertsey line, which brought in 45 shareholders and an additional 5,000 ha irrigated by BCI.

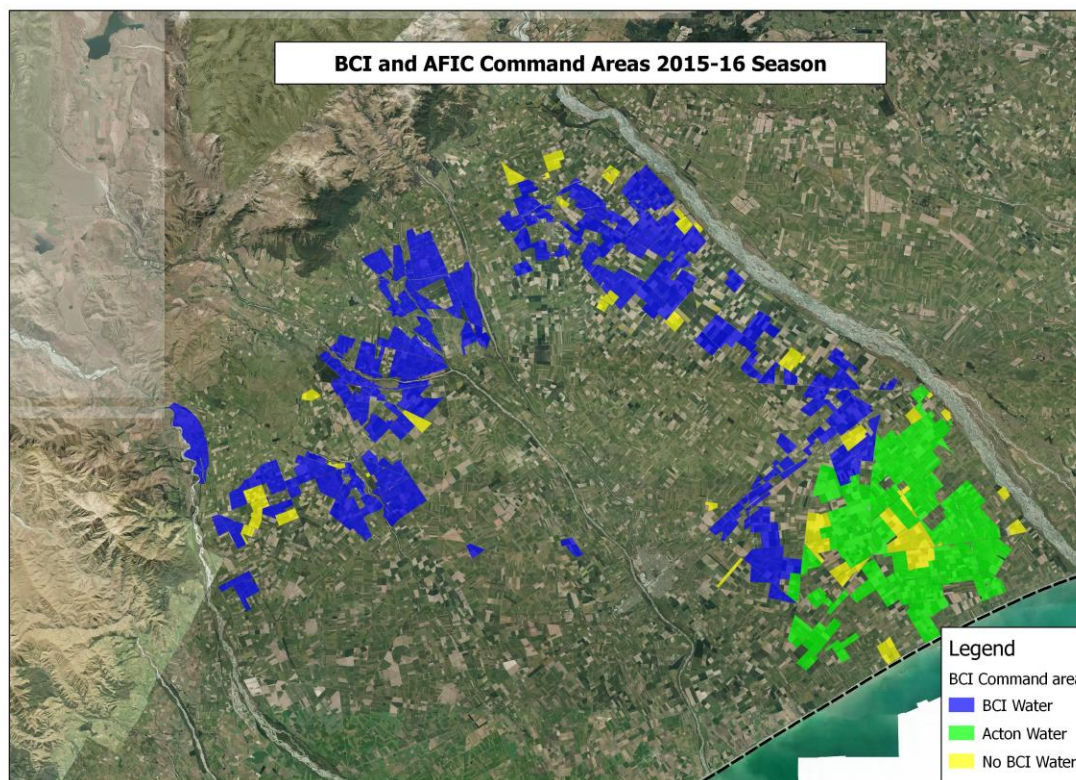


FIGURE 1: BCI AND ACTON IRRIGATED PROPERTIES

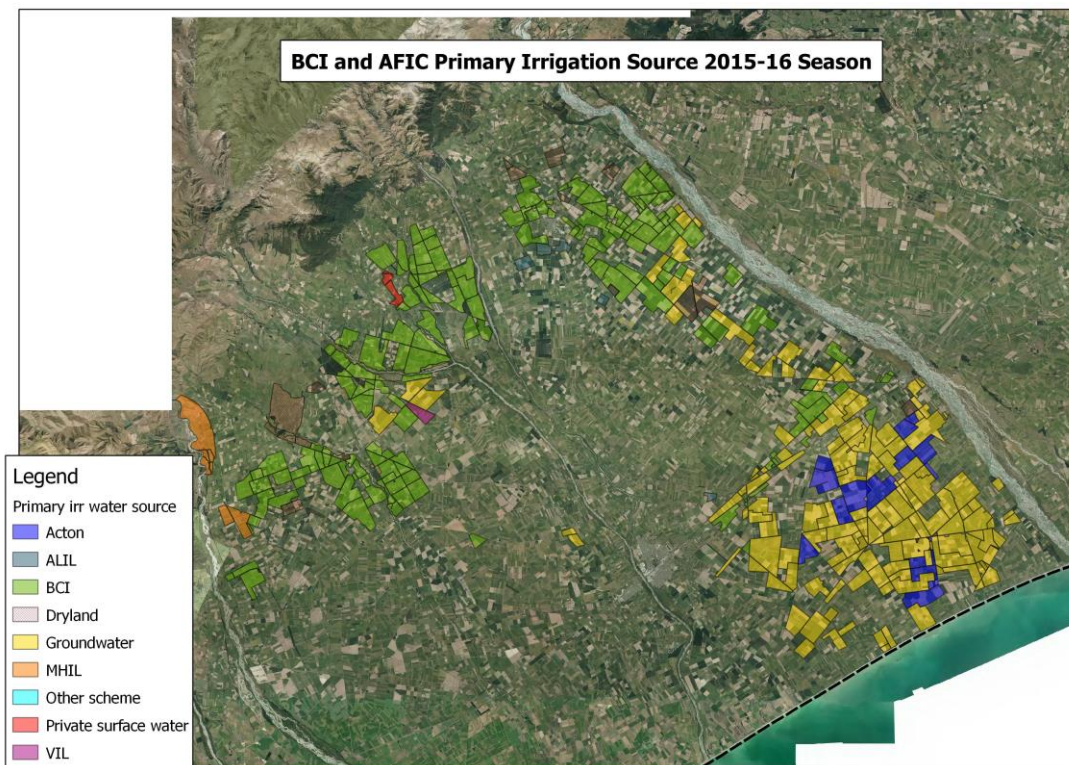


FIGURE 2: BCI AND AFIC PRIMARY IRRIGATION SOURCE 2016

CONDITION 3

A Farm Environment Plan (FEP) shall be prepared:

- a. by 10 September 2015 for any properties that had existing water supply agreements with the consent holder that were in place prior to July 2013; and*
- b. for any properties with agreements subsequent to those specified in clause a., prior to the delivery of water to that property.*

The FEP shall be prepared in accordance with Schedule One, which forms part of this consent. The FEP shall be updated as necessary and on farm practice shall be in accordance with the FEP.

All BCI and AFIC shareholder FEPs were completed in the winter of 2015 using the approved Rangitata Diversion Race (RDR) Rubicon online template.

The Irrigo Centre Limited applied for, and was granted, Schedule 7 approval of their own version of the Farm Environment Plan. This plan incorporated the Objectives and Targets of the proposed Schedule 7 of the Plan Change 5 version of the Land and Water Regional Plan. Other key changes included more detail to trend intensification by shareholders and a greater emphasis of the Good Management Practices described in the *Industry Agreed Good Management Practice Relating to Water Quality* booklet issued in September 2015.

All shareholders were required to update their FEP by 30 August 2016.

In total, 181 FEPs have been prepared between both BCI and AFIC schemes, covering a total of 238 properties over 53,700 ha.

Approximately 37 properties within our FEP/ASM programme are not irrigated by either BCI or AFIC, but form part of a farming enterprise, owned by a shareholder. We will be supporting these shareholders with meeting their zone nutrient management requirements as the rules come into effect from January 2017.

Existing Shareholder FEPs

A total of 123 BCI and 48 AFIC (171 in total) FEPs needed to be updated. Of these, two used the RDRML online template, the remainder were updated to the new Irrigo template. All templates have been checked to ensure they were completed correctly.

One FEP was not updated as the water take was for less than 5 l/s and the water was used to dampen a horse-racing track.

2016-17 Season Shareholders

A total of 13 new shareholdings have been purchased and are due to start irrigating with BCI in the 2016-17 season. Three of these have included new properties incorporated into existing FEPs. All new shareholders have been advised they will be unable to access BCI water until their FEPs have been submitted and reviewed as meeting requirements.

Two of these new shareholdings are for small takes (less than 5 l/s) and not for farming activities (one is for the Methven Rugby Club and the other is for 1 ha trial plots at SPS Seeds), we request these two properties are exempt from the full Schedule 7 FEP and nutrient budgeting requirements, such as what was approved for the Methven Trotting Club. Neither have started to use BCI water.

Dry Shareholders

BCI and AFIC have four shareholders where they own shares, but are not currently irrigated by either scheme. Three of these properties have chosen to join our nutrient management programme and have completed their FEPs and nutrient budgeting requirements.

Note for FEP Managed Area

Many shareholders use multiple sources of water on their property through a single irrigation system and therefore it was impractical to exclude these areas from the Farm Environment Plan. Shareholders were also encouraged to assess their enterprise as a whole and permitted to include properties not irrigated by BCI within their FEP. For these reasons, the FEP areas managed and audited far exceed initial estimations.

CONDITION 4

Audited Self Management Programme

- a. *Prior to 1 July 2016, the consent holder shall implement and adhere to an audited self-management programme (ASM), which is developed by a suitably qualified person and approved by the Canterbury Regional Council. The ASM document shall include, but is not limited to:*
 - i. *Environmental Targets and Objectives for the scheme and its shareholders;*
 - ii. *The proposed monitoring and reporting regime including but not limited to a description of the:*
 - a. *Farm Environment Plan (FEP) audit process and the frequency used to assess individual on-farm progress with the content of any FEP and Schedule One;*
 - b. *Methods used to follow up with shareholders who are not achieving the environmental objectives of Schedule One as identified during individual farm audits;*

- c. *The proposed data to be collected and reported to the Canterbury Regional Council;*
 - d. *Independent annual review of the FEP audit process;*
 - e. *How nutrients from all land subject to the scheme or principal water supplier will be accounted for;*
- b. *Any significant changes to the ASM document shall be implemented only after approval confirmed in writing by the Monitoring and Compliance Manager, Canterbury Regional Council.*
- c. *FEP Audits shall be undertaken by a suitably qualified person at a frequency determined in accordance with Schedule Two, with the exception of the first audit, which shall be completed in accordance with the conditions 4(c)(i) and 4(c)(ii);*
 - i. *50% of all FEPs prepared prior to 10 September 2015 shall be audited by 10 September 2016*
 - ii. *50% of all FEPs prepared prior to 10 September 2015 shall be audited by 10 September 2017*
 - iii. *All FEPs prepared after 10 September 2015 shall be audited within 12 months of being completed.*
- d. *The consent holder shall prepare an annual report describing the results of the ASM programme and the audits that have been conducted each year, The report shall include:*
 - i. *The name of the FEP auditor(s);*
 - ii. *A summary of the audit performance grading;*
 - iii. *A summary of the reasons for any farm receiving a C or D grade;*
 - iv. *A summary of farms that have repeatedly received a C or D grade;*
 - v. *The progress achieved for previously identified issues, if applicable;*
 - vi. *The total annual loss of nitrogen from all properties within the Irrigation Scheme or Principal Water Supplier over the reported year.*
 - vii. *The performance of the scheme in meeting its environmental targets and objectives.*
- e. *A copy of the annual report shall be provided to the Monitoring and Compliance Manager, Canterbury Regional Council, by 30 November each year;*
- f. *The FEP Audit records for each property undertaken in accordance with condition (4) shall be kept and made available for the Canterbury Regional Council to inspect, upon request.*
- g. *The consent holder shall notify the Monitoring and Compliance Manager, Canterbury Regional Council within 20 working days of any exclusion of a shareholder (s) from the ASM programme.*

Part (a) – Audited Self Management Programme

The BCI Audited Self Management (ASM) Programme was reviewed by Irricon Resource Solutions in October 2016. The review assessed:

- Compliance with Condition 4(a) of this resource consent
- Where improvements can be made to the Scheme Management Plan (SMP), particularly against ISO14000 system standards
- Whether the processes detailed in our SMP were being followed
- Whether audited nutrient budgets provided to determine compliance with the scheme load were robust and prepared to the Best Practice Inputs Standards
- Whether audited FEP Audit reports to ensure Canterbury Certified Farm Environment Plan (FEP) Auditor Manual (February 2016) processes were followed.

The full report is attached as Appendix 1: BCI IRRIGATION SCHEME EMS REVIEW 2016.

The overall summary of the ASM programme review states:

“ The overall impression of the reviewers is that the Scheme Management Plan is well organised and record keeping is excellent. There is generally a good approach to the environmental management system with flexibility to adapt and adjust processes to meet requirements. The review has identified some key aspects of an environmental management system which should be included in the SMP, however the SMP was found to meet the requirements of an Audited Self-Management Plan under resource consent number CRC162882.”

Part (b) – SMP Updates

The BCI Scheme Management Plan (SMP) has been reviewed to include the following information:

- Additional requirements specified by the change of conditions to this resource consent issued in December 2015
- Reference to the Industry-Agreed Good Management Practices Relating to Water Quality booklet issued in September 2015
- Recommendations arising from the Irricon BCI EMS review
- Specific details relating to the FEP Audit process
- More detailed policies and procedures relating to changes in land use, new shareholders and share transfers and the expected standards of OVERSEER nutrient budgets.

The updated Scheme Management Plan is attached as Appendix 2.

We request the Canterbury Regional Council Monitoring and Compliance Manager review and approve the updated Scheme Management Plan for implementation in the 2016-17 irrigation season.

Part (c) – 2015-16 Season FEP Audits

Farm Environment Plans (FEPs) started to be audited in the 2015-16 irrigation season. Prior to 10 September 2015, BCI and AFIC had 136 shareholders, of which there were 126 Farm Environment Plans completed. Of these shareholdings, 63 needed to be audited prior to 10 September 2016 and the remaining 63 existing shareholdings needed to be audited prior to 10 September 2017.

A further 48 shareholdings, relating to 46 FEPs, started to be irrigated by BCI in the 2015-16 irrigation season. As most of these shareholders started irrigating later in the season, we set an arbitrary date of 31 December 2016 to complete these 46 audits.

At this point in time, 11 new shareholdings have been purchased to start irrigating in the 2016-17 season. Three of these related to existing properties, and were included in their current FEPs, the remaining 8 have completed their Farm Environment Plans and will be audited by 31 December 2017.

There are currently 4 dry shareholdings of BCI and AFIC who own shares, but are not currently irrigated by the scheme. Of these, 2 properties are included in the FEPs and are audited as part of their other properties, one has completed a FEP under our programme, but not yet audited and the last one will be approached for inclusion in our programme once the nutrient management rules for his zone come into effect.

Audits of the FEPs started in October 2015 with the Environment Canterbury Auditor Training Programme. A total of 10 audits were completed through this programme. The remaining audits commenced from February 2016 through independent auditors, training audits with Ian Brown and the Irrigo FEP Auditor.

A summary of audits completed in the 2015-16 season is in Table 2.

TABLE 2: SUMMARY OF NUMBER OF FEP AUDITS COMPLETED BY 10 SEPTEMBER 2016

	Number of FEPs	Date Due for Audit	Minimum to be Completed	Completed by 10 September 2016	To be Completed 2016-17 Season
Existing Shareholders	126	50% 10-9-16 50% 10-9-17	63	80	46
2015-16 Season Shareholders	46	31 December 2016	0	29	16
2016-17 Season Shareholders	8	31 December 2017	0	0	8
Dry Shareholders	1	31 December 2017	0	0	1
Total	181		63	109	71

Part (d) – 2015-16 Season FEP Audit Summary

A summary of who completed FEP Audits and how many in the 2015-16 season is in Table 3.

All FEP Auditors have completed the Advance Sustainable Nutrient Management Course from Massey University and had received preliminary approval of meeting the requirements of a FEP Auditor from Environment Canterbury.

All auditors either attended the Environment Canterbury Auditor Training Days or were trained by the Irrigo Environmental Manager. Where there was uncertainty with a grade, we encourage auditors to contact each other, the Irrigo Environmental Manager and/or Ian Brown to ensure consistency between the grades.

TABLE 3: SUMMARY OF AUDITORS 2015-16 SEASON

	Organisation	Meets Requirements? Y/N	Number of Audits Completed
Megan Hands	Irrigo Centre Limited	Y	26
Ian Brown	Environment Canterbury	Y	10
Glen Treweek	Aqualinc	Y	42
Jane Mitchell	Independent Consultant	Y	31
Total			109

Of the 109 audits completed in the 2015-16 irrigation season, 108 audits were the first audit for the property and one was a re-audit.

As the bulk of FEP Audits started in February 2016, Dairy and Dairy Support properties and those identified as potentially being at risk of a “C” or “D” grade were targeted in the 2015-16 season, with the exception of Audits selected for training purposes.

A summary of the FEP Audit grades for the initial audit is in Table 4.

TABLE 4: SUMMARY OF FEP AUDIT GRADES 2015-16 SEASON

BCI			AFIC		Total	
	#	%	#	%	#	%
A	9	11	5	21	14	13
B	67	80	15	63	82	78
C	7	8	4	17	11	10
D	1	1	0	0	1	1
Total	84		24		108	

Overall, we found the majority (~80%) of audited properties achieved a “B” grade. The “B” grade simply meant something needed to be done to achieve Good Management Practice and there was a plan in place to improve. There was a considerable variation within “B” graded properties as to how much was required to achieve GMP, with some requiring quite a bit of work and considerable on-going support, whereas will require very little.

For instance, we found 42% of “B” grades could easily achieve an “A” grade, if they could demonstrate adequate soil moisture monitoring and calibration of irrigation systems. This is unsurprising due to the high proportion of arable properties within the scheme, of which cost-effective and useful soil moisture monitoring technologies suitable for this type of farming system have only recently come onto the market.

In response to these observations from the FEP Audits, BCI and AFIC have organised information sessions on Soil Moisture Monitoring Options and Irrigation Maintenance and Calibration. The first of these were held February and March 2016, with follow up sessions on the 30th November 2016.

Furthermore, the scheme has organised workshops on Irrigation Maintenance and Calibration and have been supportive of Environment Canterbury’s initiative for bucket tests in the Ashburton area. The Irrigation Maintenance and Calibration workshops demonstrate the how and why of bucket tests and started in October 2016. To date, we have had approximately 60 shareholders and their staff attend, with two more sessions booked in for December 2016. Approximately 45 shareholders have signed up to have bucket tests completed with ECan’s students this coming summer.

Provided our shareholders continue with implementing these improvements in irrigator calibration and soil moisture monitoring, we would expect a significantly higher proportion of “A” grades when these properties are audited again.

Reasons for “C” or “D” grades

Only Dairy or Dairy support blocks achieved “C” or “D” grades in the 2015-16 season because these were the land uses targeted in February/March when the majority of audits were completed.

Generally, the environmental effect of “C” grade farms was not significantly different from most “B” grade farms. However, it was observed there were often other issues going on which would hinder the engagement and uptake of Good Management Practices on-farm over time.

Every property receiving a “C” grade has had a follow up visit and included the recommendations into their 2016 FEP Update.

TABLE 5: SUMMARY OF REASONS FOR "C" GRADES

Reason for C or D grade	# C Grades	Follow Up Action
Lack of Training	12	One on one follow up, personally advise of applicable training days
Financial Pressure	3	Properties now sold or on sale
Poor communication between owner/leaseholder	6	Encourage both leaseholder/staff and owner to attend training days and FEP Update one on ones
Inadequate infrastructure	5	Create a plan to upgrade in the medium term and improve back-up plans until upgrades can occur
Exiting the Industry	4	Provide one on one support to get by until property either sold or owner retires
Attitude/Disengaged from process	5	Identify root cause (if any) and provide support where required, complete one on one, recommend suitable training days.

There was a single “D” grade in the 2015-16 season. This property demonstrated poor dairy effluent management, which was a result of a breakdown in the relationship between the owner and the contract milker, a lack of training and inadequate infrastructure.

Immediately following the “D” grade, we notified Fonterra to initiate a one on one conversation regarding the upgrades required of the effluent system and followed up with preparing an Action Plan.

The follow up audit was completed in May 2016. The grade improved to a “C” grade as there was no significant issues with the effluent management observed, and steps had been taken to improve the situation, however the auditor felt staff training and management had not been adequately addressed and more work will be required. It was known there was intending to be a change of management in the 2016-17 season, which would hopefully improve the outcome with the effluent.

If further C or D grades are received on this property, warnings of a breach of the Water User Agreement will be issued in the coming season.

Of the 12 C or D grades issued in the 2015-16 season, the following progress has been made:

- 3 have been sold or are up for sale
- All have had a one on one to create a plan to improve their practices, including new owners
- 4 have been active in attending training workshops this season

Scheme Performance with Objectives and Targets

Grades given for each objective and target assessed in the FEP Audits were collated and are summarised in Figure 3. The only Low Level of Confidence (LOC) grade given against an objective was related to effluent on the “D” graded property. Most Low LOC grades for targets

were given for staff training in irrigation and effluent, irrigation scheduling and for the preparation of the 2014-15 season nutrient budgets.

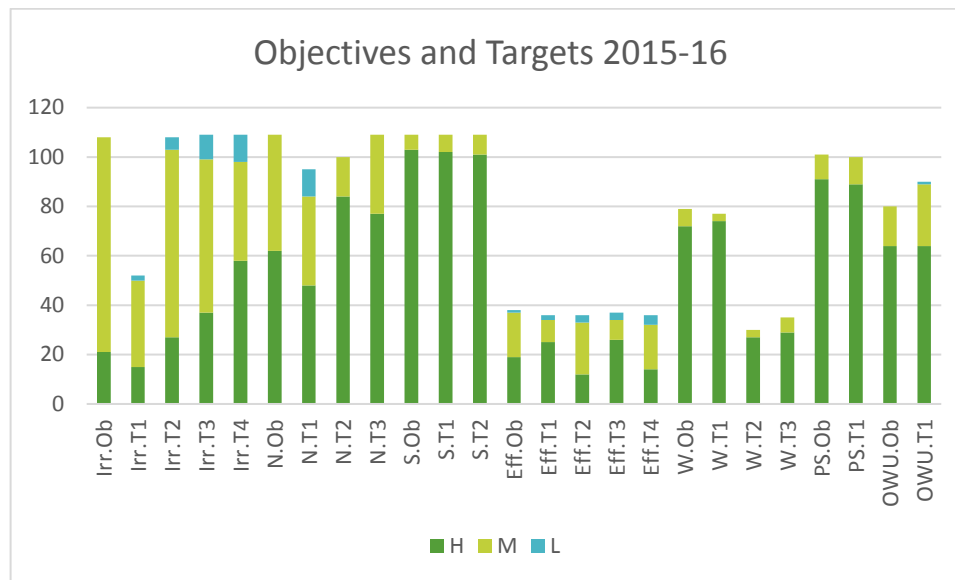


FIGURE 3: SUMMARY OF AUDIT GRADES FOR OBJECTIVES AND TARGETS

The majority of lower grades given against the nutrient management Target 1 (relating to nutrient budgets) were due to the inconsistency of preparation of the 2014-15 season nutrient budgets preventing the auditors from having confidence in assessing whether or not the N loss number reflects the activities on the property. A more standardised approach to the preparation of the 2015-16 season nutrient budgets should be able to address most of these issues.

Overall, the largest proportion of Medium LOC grades were issued in irrigation management targets, with most shareholders doing well in fertiliser and soils management.

Approximately 80% of shareholder properties have open stockwater races, however only 30% are located near natural waterways. Of these, the natural waterbody is generally adjacent to, but outside the property for all but two properties in the scheme. For this reason, the vast majority of properties were not assessed against Waterbody Targets 2 and 3.

The Other Water Use Objective is not currently included in the Farm Environment Plan Schedule One and is currently under review as part of the Plan Change 5 submission process, therefore does not affect the overall grade of the audit at this point in time. However, we are advising shareholders of these requirements, particularly of the need to meter water usage in dairy sheds by 2020 under the Sustainable Dairy Water Accord.

Parts (e), (f) and (g) – Other Requirements

This report meets the reporting requirements of resource consent CRC162882.

All FEP Audit records are kept on file, as assessed as part of the Irricon EMS review.

No shareholder has been excluded from the Scheme in the 2015-16 season.

CONDITION 5

The combined average annual amount of nitrogen lost to water as calculated from the individual Farm Environment Plans prepared in accordance with condition 3. shall not exceed a total of 1,232 tonnes if Overseer version 6.0.3 is used or X tonnes if a subsequent Overseer version, or equivalent model approved in writing by the Canterbury Regional Council RMA Compliance and Enforcement Manager is used. For the purposes of this condition, X equals the total average annual nitrogen loss calculated using the current version of Overseer, or equivalent model approved in writing by the Canterbury Regional Council RMA Compliance and Enforcement Manager, based on the following:

- a. 17,604 hectares of land with irrigation supply agreements in place with the consent holder prior to July 2013; and*
- b. 22,396 hectares of subsequent irrigation areas;*

Provided that the land uses and management practices modelled must be consistent with the activities described in the application.

Updated N load Limited with OVERSEER 6.2.2

The OVERSEER model was updated to v6.2.2 in May 2016 and did not include any significant changes, compared to previous years.

PDP were employed in August 2016 to update the background files and recalculate the nitrogen discharge allowance (NDA) using OVERSEER v6.2.2. A copy of the PDP report is included as Appendix 3: Revised N Load Calculation – v6.2.2 OVERSEER

The recalculated NDA, was **2,801 tonnes N/year**, assuming 1,533 tonnes N/year from existing shareholders and 1,268 tonnes N/year for new shareholders. The N loading limit assumed a total of 40,000 ha irrigated by BCI.

Land use estimates were relatively consistent with the original NDA calculation, though with a higher proportion of arable properties signing onto Stage 2 than anticipated.

Primary and Secondary Land use is summarised in Figure 4, Figure 5 and Table 6. Approximately 67% of BCI and AFIC shareholders have more than one use of land, with 26% having three or more uses.

TABLE 6: PRIMARY LAND USE DISTRIBUTION BY FEP

	2015 Primary Land Use	2016 Primary Land Use	Estimated Land Use*
Arable	54%	52%	38%
Dairy	29%	20%	40%
Dairy Support	16%	20%	18%
Sheep & Beef, Mixed, Other	1%	8%	4%

*From consent application

The majority of shareholders who started irrigated within BCI in 2015-16 and 2016-17 season were arable or beef grazing.

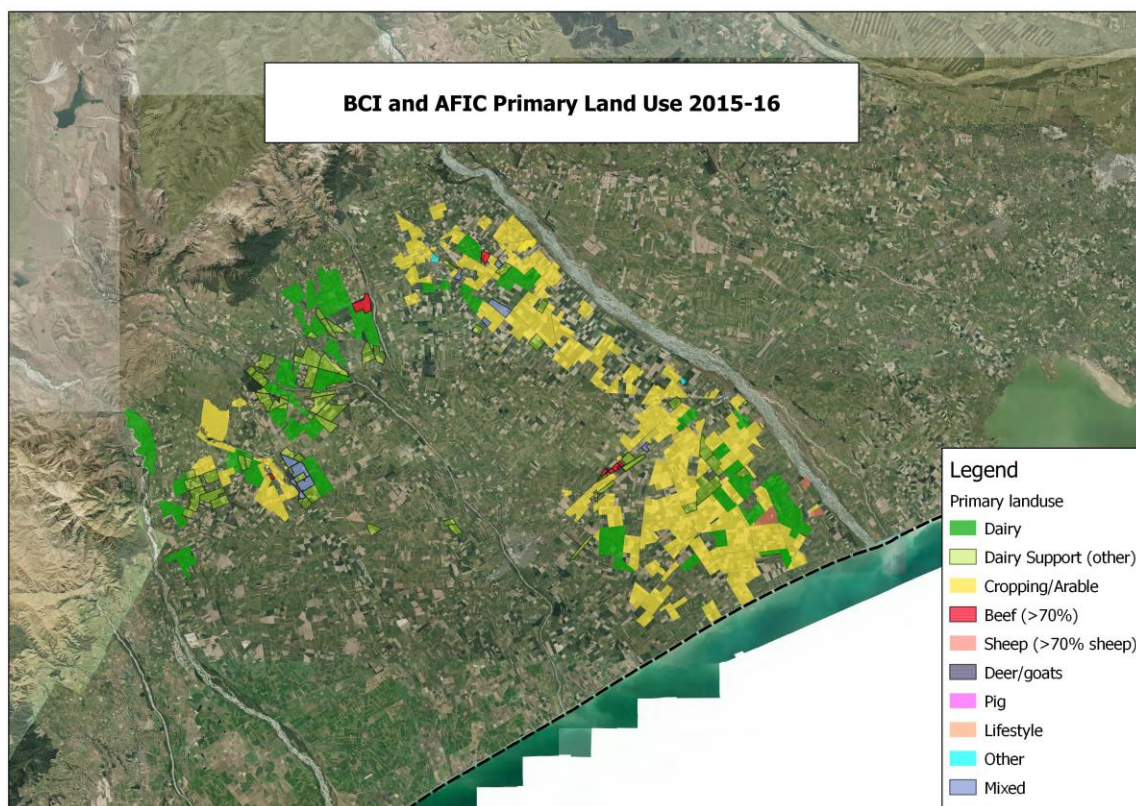


FIGURE 4: 2015-16 PRIMARY LAND USE FOR BCI SHAREHOLDERS

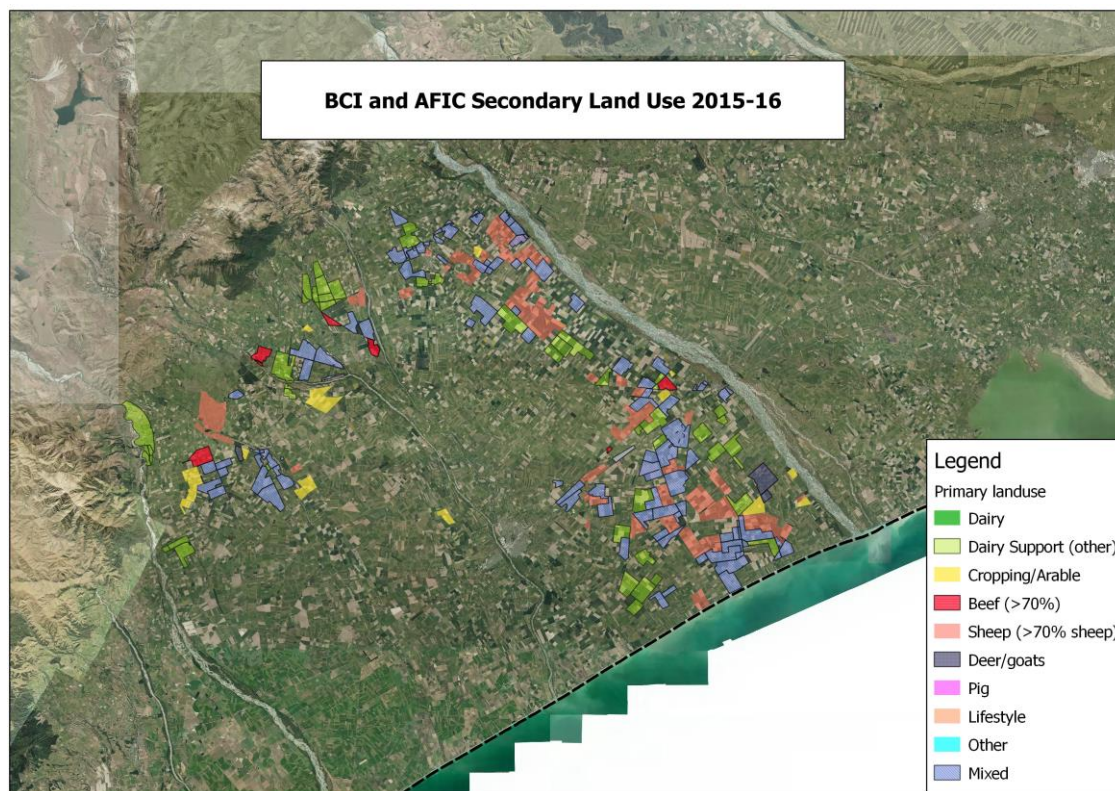


FIGURE 5: BCI AND AFIC SECONDARY LAND USE 2015-16

2015-16 Season N loss

To facilitate the preparation of nutrient budgets, BCI signed Memorandums of Understandings (MOUs) with both Ballance Agri-Nutrients and Ravensdown Environmental Teams. We provided their consultants with the maps and areas of each property, which was recorded through their FEP the previous season.

All nutrient budgets were prepared by or reviewed by suitably qualified professional in accordance with the Best Practice Data Input Standards (April 2015) (BPDIS) where possible, or an explanation provided as to why deviation was necessary.

In the 2014-15 season nutrient budgets, the irrigation inputs methodology varied considerably between consultants, and therefore made comparisons between neighbours and land use types very difficult. For instance, when using the default irrigation settings, we found the modelled applications depths to be 900-1100 mm/year, when the measured water usage data for a drier season was 350 mm/year. These values impacted on the N loss calculation considerably for the properties and did not necessarily reflect the activities on-farm, even if prepared according to the BPDIS.

In these circumstances, we requested all consultants preparing nutrient budgets to consider the annual volume and average application depth of water applied (per crop where available) to a property over a season.

We believe this methodology and the consistency of the approach will better identify those properties who can make improvements in their farm practices to reduce their N losses.

All shareholders irrigated by either BCI or AFIC in the 2015-16 season completed an OVERSEER nutrient budget, using data collected in the 2015-16 season and the above methodology. Most budgets were completed using v6.2.2, however 6 nutrient budgets were completed in v6.2.3, released in November 2016.

It is noted v6.2.3 of OVERSEER corrected a N uptake error in the crop model, which will generally increase N losses in arable properties. These increases were quite noticeable in the properties modelled in this version, however we have still used these figures for calculating the scheme load this year, which will overestimate N losses compared to shareholders modelled in v6.2.2.

All nutrient budgets were prepared for the whole property. As mentioned in condition 2, many properties irrigated by BCI were also irrigated by other sources of water. The total N loss used to calculate the BCI NDA load was proportional to the amount of water the scheme provided for the property. E.g. if BCI supplies 50% of water to the property, then 50% of the N load was added to the NDA. If BCI was the only source of water for the property, the nutrient loss for the whole property (including the effective dryland) was included in the scheme load. Where there was multiple sources of water, the N loss from the effective dryland was proportioned according to the relative amount of water provided from each source. The details of how these calculations are made were included in the SMP.

A calculated N loss figure could be prepared for every shareholder this season, however at least 25% of all nutrient budgets were required to complete a “workaround” to overcome errors within the model and so do not necessarily reflect the activities on the property the previous season. Some examples of common workarounds include:

- Replacing stock with “non-farm animals”
- Including a pasture block where there were none
- Adjusting the yield of crops or amount of supplementary feed made/removed to feed stock
- Modelling various seed crops as “Ryegrass seed”

In each case a “workaround” was needed, we recorded that one was completed, kept the original input file so there is a record of what actually happened on the property that season, and recorded the type of workaround made.

Table 7 compares 2015-16 season N loss per scheme with the amount of N lost expected by our models.

The calculated N loss for all current shareholders in the 2015-16 season was **1,653 tonnes N/year**, below the 1,687 tonnes N per year estimate.

Based on these results, BCI is currently utilising 68% of their water allocation, however have only used 59% of their nutrient allocation and are therefore on track to meeting their nutrient loss requirements as they continue to develop in the next few years.

TABLE 7: SUMMARY OF 2015-16 N LOSS FOR SCHEME

	2015 Modelled N Loss for current shareholders	2016 Modelled N Loss for current shareholders	Estimated N Loss for current shareholders*
Total FEP Managed N Loss (tonnes N/year)	2,420	2,773	2,801
BCI Scheme N Loss (tonnes N/year)	944	1,410	1,412
BCI Average N loss (kg N/ha/year)	55	58	101
AFIC Scheme N Loss (tonnes N/year)	297	243	275
AFIC Scheme Average N Loss (kg N/ha/year)	54	49	53
Total BCI N Loss (tonnes N/year)	1,241	1,653	1,687
Overall Average N loss (kg N/ha/year)	55	55	70

*Updated N loss calculated in Appendix 2 attached.

CONDITION 6

The consent holder shall ensure that each farm that it supplies water to shall maintain detailed records of fertiliser application rates, location and crop type (including winter feed/forage crops), cultivation methods, stock units by reference to type and breed, and all other inputs to the Overseer nutrient budgeting model. The records shall be made available to the Canterbury Regional Council on request.

All shareholders are aware of the requirements to improve records used to provide an OVERSEER nutrient budget annually.

CONDITION 7

The Canterbury Regional Council may, once per year, on any of the last five working days of May or November, serve notice of its intention to review the conditions of this consent for the purposes of dealing with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage.

No comment required.

